fresh specimen and take another look at it. The spores are triseptate *fusiform*, not "filiform," as the Sylloge has it.

7. BACTRIDIUM. There seems to me to be but a single species; with moist weather it grows throughout the year; it is a very interesting object under low power; the spores are extremely large and in a drop of water tumble down like ninepins. They are most commonly 4-septate, as I observe them, with the middle cell much the largest; this corresponds to *B. clavatum* B. & Br.; 1–3-septate specimens are not uncommon, which will pass for *B. Ellisii* Berk.; rarely I bring in a specimen with abundant spores 5, 6 and even 7-septate; there seems nothing to hinder this being *B. flavum* K. & S.

8. *Næmatelia nucleata* Schw. The plant I have so referred has white, oblong curved spores 10–12 mic. in length. The European (?) plant under this name, with ovoid spores 7 mic. long, must be something different. It is very common with me on branches of sugar maple; it originates beneath the bark and shows itself in lines along the crevices.

9. *Stereum albobadium* Schw. I have lately observed that the velvety surface of the hymenium in this species is caused by hyaline fusiform bodies with a warted surface, called *metuloids;* hence it belongs in Dr. Cooke's genus Peniophora.

10. *Dacrymyces deliquescens* Bull. Bringing in some specimens, the other day, I caught the spores on a slide in great abundance, and observed that against white paper they were a pale yellow in color. They are invariably 3-septate, and my measurements of the mature spores were 14–16 × 6–7 mic., smaller than Karsten's, but about the same as Saccardo's.

Preston, Ohio.

A Revision of North American Cornaceæ. II.

JOHN M. COULTER AND WALTER H. EVANS.

++++ Lower leaf-surface with only straight appressed-pubescence (except sometimes no. 14) or none.

14. **C. stolonifera** Michx. Fl. 1.92. Shrub is 1 to 3 meters high, erect or prostrate, stoloniferous, with branches usually bright red-purple and smooth: branchlets and inflorescence appressed-pubescent: petioles 6 to 36 mm. long; leaves from lanceolate to broadly ovate or oblong, short or long acuminate

or only acute, mostly obtuse at base, minutely appressed-pubescent above (or glabrate), more or less white and appressed-pubescent beneath with straight rigid hairs (sometimes becoming almost glabrate and inclined to be more or less woolly along the lower part of the midrib), 2.5 to 12.5 cm. long, 1.2 to 7 cm. wide: flowers mostly in small cymes: calyx-teeth minute: fruit white or lead-color; stones very variable, from ovate and pointed, scarcely flattened, higher than broad (5 to 6 mm. high, 3 to 4 mm. broad), to more or less flattened, broader than high (3 to 4 mm. high, 5 mm. broad), these extremes completely connected by intermediate shapes and dimensions, all with more or less furrowed edge.—*C. alba* Lam., not Linn.

Hab. From New Brunswick and New England to the District of Columbia in the Atlantic region, extending westward throughout the region of the Great Lakes, far northwest into British America along the Mackenzie river, and southward throughout the western mountain systems to New Mexico, Arizona, and N. California.

Specimens examined: Prince Edward's Island (*Macoun*); New Brunswick (*Chalmers*); Vermont (*Pringle*); Massachusetts (*Oakes*); District of Columbia (*Ward*); Pennsylvania, Erie (*Garber*); W. New York (*Gray*); Ontario (*Macoun* 526, 2241, *Mrs. Ray*); Michigan, Mackinaw, Flint (*Clarke*); N. Indiana (*Coulter*); Illinois, Peoria (*Brendel*); Wisconsin (*Douglas*); Minnesota (*L. H. Bailey* 39); Winnipeg Valley (*Bourgeau*); Mackenzie river (*Hardesty*); British Columbia (*Richardson, Macoun*); Montana (*Watson* 166, 167, *Canby, Ward*); Washington (*Suksdorf, Mrs. L. P. Anderson, G. R. Vasey*); Oregon (*Spalding, Nevius, Henderson*); California (*Bridges*), Modoc and Shasta counties (*Lemmon*), Trinity county (*C. C. Marshall*), Plumas county (*Mrs. Ames, Mrs. Austin*), Butte county (no collector cited); Nevada (*Watson* 473, *C. L. Anderson* 120); Utah, Uinta mountains and Salt Lake City (*Watson* 373); Colorado (*Hall & Harbour, Hooker & Gray, Engelmann, Wolf & Rothrock* 79, *Coulter, Jones* 125, *Patterson*); New Mexico (*Fendler* 280, *Pulmer*), Ft. Wingate (*Matthews*); Arizona (*Pulmer*); also from "Rocky mountains" (*Nuttall, Scoville*).

C. stolonifera, *C. Baileyi*,[1] and *C. pubescens* from a very perplexing and

[1]Since the preceding part of this paper was in print the following communication has been received from Professor L. H. Bailey, in reference to the species bearing his name: "The erection into specific rank of a very puzzling and interesting Cornus, in the February GAZETTE, calls to mind some observations which may be valuable. As a lad I was familiar with the plant upon the sand dunes of southwestern Michigan. It was early impressed upon my mind for two reasons, viz: its habit of blooming continuously all summer, and its persistence in evading all descriptions in the books. It grows often in the loosest shifting white sands, along with such things as Solidago humilis var. Gilmani, Arctostaphylos Uva-ursi, Cnicus Pitcheri, Cakile Americana, Arabis lyrata, and Cyperus Schweinitzii. In these places it often attains a height of six or eight feet, growing erect,

apparently confluent group of species. In all probability they freely cross with one another, and some of the puzzling intermediate forms may be hybrids. *C. stolonifera* extends both east and west, mingling with *C. pubescens* upon the Pacific coast, and with *C. Baileyi* about the Great Lakes, and it is in these regions that the doubtful forms occur. In typical specimens the three species can be distinguished easily by the pubescence of the lower leaf-surface. In *C. stolonifera* this pubescence is all very straight and appressed, the hairs being attached by the middle; in *C. pubescens* it is all woolly; while in *C. Baileyi* both kinds of pubescence occur on the same leaf. For this reason *C. Baileyi* has heretofore been considered *C. stolonifera*, in spite of its often abundant woolly pubescence. The pubescence thus easily separates *C. pubescens* and *C. stolonifera*, while the stone of *C. Baileyi* is very unlike that of either of the other species, whose stone characters are not so constant. The stone of *C. Baileyi* is the largest of the group, is decidedly flattened, is much broader than high, has a square-shouldered top, is not oblique, and has a prominent furrowed edge. The stone of *C. pubescens* is smaller, is less flattened, has a rounded top, is decidedly oblique, and has not generally so conspicious or furrowed an edge. Its obliqueness, together with its tendency to develop ridges on the sides, show a leaning towards *C. sericea*. The stone of *C. stolonifera* is exceedingly variable, being sometimes ovate and pointed, higher than broad, and scarcely flattened; in other cases almost identical with the stone of *C. pubescens*, but never like that of *C. Baileyi*. The specimens of *C. stolonifera* in which the stones resemble those of *C. pubescens* are mostly western, where the ranges of the two species approach each other or overlap. The stones of eastern *C. stolonifera* are more apt to have the ovate pointed form referred to above, and were it not for the fact that occasionally the most widely divergent forms of stones are to be found in a single fruit-cluster of *C. stolonifera*, a western variety might be established. In the Pacific States and British Columbia, therefore, collectors must expect to find forms fairly intermediate between *C. pubescens* and *C. stolonifera*; while about the Great Lakes they may expect the same confusion between *C. Baileyi* and *C. stolonifera*.

15. **C. candidissima** Marsh. Arbust. 35 (1785). Shrub 2.5 to 4.5 meters high, erect, with smooth mostly grayish branches:

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and never possessing the stoloniferous habit of C. stolonifera so far as I am aware. The bark is much duller and browner than that of C. stolonifera. Wherever I have seen it, from near the southern extremity of Lake Michigan to the northwestern shore of Lake Superior and Hunter's Island in British America, it maintains the pearly white berries and the conspicuously tomentose leaves. It appears to possess everywhere the habit of blooming through the summer, and for this reason it may be worth cultivating. This peculiarity I recorded so long ago as 1880 in this journal (BOT. GAZETTE, 5. 91): 'It is worthy of note that *Cornus stolonifera* Mx. is quite common on the highest bluffs. I have seen it growing luxuriantly in drifting sand over a hundred feet above the lake, and blossoming from June till near September.'"—*Ithaca, N. Y.*

branchlets and inflorescence glabrous or nearly so: petioles 6 to 18 mm. long; leaves lanceolate to ovate, acuminate, acutish at base, minutely appressed-pubescent or glabrous on either or both sides, the lower surface from whitish to scarcely paler than the upper, 3.5 to 10 cm. long, 1.2 to 5 cm. wide: flowers in numerous loose paniculate cymes: calyx-teeth from small to prominent: anthers more or less blue along the connective (especially in the southern forms): fruit white to pale blue; stone small, nearly globular, not furrowed or very slightly so, 3 to 5 mm. in diameter.—*C. stricta* Lam. (1786). *C. paniculata* L'Her (1788). *C. fastigiata* Michx.

Hab. From New England to Florida, westward to Minnesota and Texas.

Specimens examined: Vermont (*Pringle*); Connecticut (*Eaton*); Pennsylvania (*Bridges, Martindale*); New York (*Gray*); Ontario (*Macoun* 530, 766); Michigan (*Pitcher*); Illinois (*Bebb, Wolf, Babcock, Brendel*); Wisconsin (*Mrs. Luce*); Minnesota (*Upham*); Maryland (*J. D. Smith, Sheldon*); South Carolina (*Ravenel, Gibbs*); Florida (*Curtiss* 1058, *Canby, Palmer, J. D. Smith*); Georgia (*Boykin, Rugel, Miss Reynolds*); Louisiana (*Hale, Peck*); Texas (*Hall* 265).

This species is widely distributed and replaces *C. stolonifera* in the southern states. It seemes impossible to discover any characters that will serve to break it up into varieties, much less into two species as formly considered. There is the greatest possible intermingling of the characters that were formerly considered to distinguish *C. paniculata* from *C. stricta*, and large series of specimens show that no such dividing line exists. The species is most nearly related to *C. stolonifera*, and where the ranges of the two overlap doubtful forms frequently occur. *C. candidissima* differs from *C. stolonifera*, however, in its erect habit and grayish branches, its frequently glabrous leaves, its abundant loose paniculate cymes, its frequently blue-tinged anthers, its thin-fleshed fruit, and its small globular stones.

16. **C. glabrata** Benth. Bot. Sulph. 18. Shrub 1.5 to 3.5 meters high, with erect and mostly bushy gray smooth branches bearing usually crowded small leaves: branchlets and inflorescence glabrous or nearly so: petioles short and slender (12 mm. or less long); leaves lanceolate to nearly ovate or oblong, acute at each end (or somewhat acuminate), glabrous or sparsely and minutely appressed-pubescent on both sides, the lower surface but little paler than the upper, 1.2 to 5 cm. long, 9 to 25 mm. wide: flowers in numerous small open cymes: calyx-teeth prominent: anthers inclined to be blue along the con-

nective: fruit white to light blue; stone but little compressed, not furrowed, broader than high (3 to 4 mm. high, 4 to 5 mm. broad).

Hab. In the coast ranges from the southern border of Oregon into California as far south as the Salinas valley.

Specimens examined: Oregon, Josephine county (*Howell*); California, "Coast Range" (*Hartweg* 1762, *Bolander* 127), Siskiyou county (*Greene* 875), Butte county (*Parry* 777, *Mrs. Bidwell*), Napa county (*Bolander* 2657), Sacramento county, on the Consumnes river (*Rattan*), Salinas river (*Brewer* 566, *G. R. Vasey* 235).

This restricted species is most nearly related to the eastern *C. candidissima,* but differs decidedly in its stone characters. It is most apt to be confused with Californian forms of *C. stolonifera,* and forms occur which seem intermediate between the two. In such intermediate forms the leaves are apt to become broader than in *C. glabrata*, more strongly appressed-pubescent, whiter beneath, the branches incline more to be reddish, and the stone becomes flatter and more or less furrowed, and even as high as broad or slightly higher, intergrading plainly with the leaves and variable stone of *C. stolonifera.* Such forms we must be content at present to consider as intermediate (possibly hybrids), and collectors must not expect every specimen to be strictly one or the other species. Typical *C. glabrata* can always be recognized by its bushy habit, gray branches, and small crowded nearly glabrous leaves which are about the same color on both sides. We would cite as intermediate forms: *Pringle* 306, from Summit valley, California, which is completely glabrous, but the leaves are whitish beneath and the stone has often the flattened furrowed form of western *C. stolonifera* or *C. pubescens*, but showing the variability of the former species; *Parry* 777 in part, from Chico, which is like the Pringle specimen except that the leaves are decidedly appressed-pubescent beneath. *Greene* 875, from Siskyou county, referred above to the type, differs from it in the decidedly whitish lower leaf-surfaces, and in the fact that the stones vary from broader than high to slightly higher than broad.

++Leaves alternate and clustered at the ends of branchlets.

17. **C. alternifolia** Linn. f. Suppl. 125. Shrub or tree 2.5 to 8 meters high, with widely spreading alternate green branches: petioles slender, 2 to 3.5 cm. long; leaves oval or ovate, mostly long acuminate, obtuse or acute at base, glabrous or sparsely pubescent above, whitish and appressed-pubescent beneath, 5 to 10 cm. long, 3 to 6 cm. wide: flowers in broad open pubescent cymes: calyx-teeth minute: fruit deep blue on reddish stalks; stone obovoid, longitudinally furrowed (5 to 6 mm. high, 4 to 5 mm. broad).

Hab. In rich woods and along borders of streams and swamps, from New Brunswick and Nova Scotia to the west side of Lake Superior, southward throughout the Northern States and along the Alleghanies to N. Alabama and N. Georgia.

Specimens examined: Maine (*Redfield*); Vermont (*Pringle*); Connecticut (*Eaton, Bishop*); Long Island (*Young*); Maryland (*J. D. Smith*); Pennsylvania (*Martindale*); New York (*Gray, Clinton*); Ontario (*Macoun* 772); Michigan (*Clarke*); Indiana (*Thomson, Evans*); Illinois (*Wolf, Brendel, Hovey*); Iowa (no collector given); Wisconsin (*Douglas, Mrs. Luce*); N. Georgia (*G. R. Vasey*).

2. NYSSA Linn. Gen. n. 1163. The older systematists described a good many more species of *Nyssa* than can now be allowed since more material has been accumulated. The species are naturally grouped into those with small fruits and those with large fruits, while the stone characters are absolutely definite as to species. An interesting gradation in stone characters is to be noted. In *N. aquatica* the low, broad ridges of the terete stone are hardly more than outlined; in *N. biflora* the stone is flattened, and the ridges become rounded and prominent, giving a furrowed appearance to the thin-fleshed fruit; in *N. uniflora* the ridges are acute and prominent, separated by broad rounded depressions; in *N. Ogeche* the ridges are sharp as in the last, but are also extended into conspicuous membranaceous wings.

* Fruit small (8 to 13 mm. long); stone with low broad rounded ridges more or less distinct.

1. **N. aquatica** Linn. Spec. 1058 (restricted). A tree becoming 15 to 36 meters high, or much smaller at the north: leaves from linear-oblong or lanceolate to oval or obovate, acute or acuminate, entire, smooth and shining (when old) above, more or less hairy along the veins beneath, or almost woolly when young, 5 to 17.5 cm. long, 1.8 to 8.5 cm. wide: staminate flowers numerous in loose or somewhat dense clusters: pistillate flowers 2 to 14, at the summit of a more or less elongated peduncle, mostly developing 1 to 3 fruits: fruit ovoid, acid, bluish-black, 8 to 13 mm. long; stone ovoid, slightly flattened or not at all, smooth or scarcely ridged, 7 to 10 mm. high, 5 to 8 mm. broad. *N. sylvatica* Marsh. *N. multiflora* Wang. *N. villosa* Michx. *N. multiflora*, var. *sylvatica* Watson.

Hab. From S. Maine to Ontario and Michigan, southward to Florida and Texas.

Specimens examined: Rhode Island (no collector given); Connecticut (*Wright, Eaton*); New York (*Darby, Edgerton*); New Jersey (*Martindale*); Pennsylvania (*Hoopes, Martindale*); Ontario (*Macoun* 103); Ohio (*Riddell*); Indiana (*Coulter*); Michigan (*Pitcher, Clarke*); Maryland (*J D. Smith*); District of Columbia (*Vasey, Ward*); Virginia (*A. H. Curtiss*); North Carolina (*Gray, A. H. Curtiss, J. D. Smith*); South Carolina (*M. A. Curtiss, Ravenel*); Georgia (*Olney & Metcalf* 269); Florida (*Chapman, Curtiss* 1061, *Garber*); Tennessee (*Fendler*); Arkansas (*Fendler*); Texas (*Hall* 267).

The original *N. aquatica* of Linnæus contained also *N. uniflora*, but that occupies a subordinate place in his description. It seems proper, in breaking up the original Linnæan description to retain his name for that species which was evidently most prominent in his mind.

2. **N. biflora** Walter, 253. Resembling the last, but leaves smaller, 2.5 to 7.5 cm. long, 1.2 to 3.5 cm. wide, acute or obtuse: pistillate flowers 1 to 3 (commonly 2): stone decidedly flattened and prominently and obtusely ridged, making a longitudinally furrowed fruit. *N. Caroliniana* Poiret. *N. aquatica* Chapman, not L.

Hab. From New Jersey to Florida, and westward to Tennessee and Alabama.

Specimens examined: New Jersey (*Torrey*); Delaware (*Canby*); South Carolina (*Mellichamp, J. D. Smith*); Georgia (*A. H. Curtiss* 1062); Florida (*Chapman, Rugel, J. D. Smith*); Alabama (*Watson, Mohr, G. R. Vasey*); Tennessee (*Gattinger*).

This species is very closely allied to *N. aquatica*, but the usually smaller leaves, fewer pistillate flowers, and flattened conspicuously ridged stone and fruit are more definite and constant characters than are used to separate many species of *Cornaceæ*.

* * Fruit large (16 to 36 mm. long); stone with very prominent acute or winged ridges.

3. **N. uniflora** Wangenh. Amer. 83. A large tree 18 to 30 meters high: leaves long-petioled, ovate or oblong, mostly obtuse or even cordate at base, acute or acuminate, entire or angulate-toothed, becoming smooth above, pale and downy pubescent beneath (especially when young), 7.5 to 25 cm. long, 3.5 to 12.5 cm. wide: staminate flowers numerous in rather dense clusters: pistillate flowers solitary on slender elongated peduncles: fruit olive-shaped, becoming dark-blue, 16 to 30 mm. long; stone narrowly obovate, flattened and with prominent acute almost winged ridges, as high as the fruit and 8 to 12 mm. broad.—*N. aquatica* L. in part. *N. denticulata* Ait. *N. angulosa* Poir. *N. tomentosa* Michx. *N. angulisans* Michx. *N. grandidentata* Michx. f.

Hab. S. Virginia to Florida, westward through the Gulf States to Texas, thence northward through Arkansas, Missouri and Tennessee to the Lower Wabash in S. Illinois.

Specimens examined: Virginia (*L. F. Ward*); South Carolina (*Ravenel, Mellichamp*); Georgia (*Curtiss* 1863); Florida (*Chapman, Rugel*); Alabama *Mohr., J. D. Smith*); Tennessee (*J. D. Smith*).

The fruit is commonly called "wild olive."

4. **N. Ogeche** Marshall, Arbustum 97 (1785). A tree 9 to 18 meters high: leaves thickish, short-petioled, oblong, oval, or obovate, mostly obtuse (sometimes retuse) and mucronate, entire, becoming smooth above, more or less (usually rusty) pubescent beneath, 6 to 13.5 cm. long, 3.5 to 7.5 cm. wide: staminate flowers in capitate clusters: fertile flowers perfect, solitary, on very short peduncles: fruit olive-shaped, very acid, red, 24 to 36 mm. long; stone oblong, somewhat flattened, as long as the fruit and 10 to 14 mm. broad, the acute longitudinal ridges extended into about 12 conspicuous membranous wings.—*N. capitata* Walter (1788). *N. coccinea* Bartram. *N. tomentosa* Poir. *N. candicans* Michx.

Hab. In swampy ground from the southern border of South Carolina, southward through the Ogeechee valley of Georgia to northern (Clay county) and western (Washington county) Florida.

Specimens examined: South Carolina, Bluffton (*Mellichamp*); Georgia, Ogeechee river (*Darby, Curtiss* 1064); Florida (*Chapman*); Hibernia (*Canby*).

This species has been said to occur in Arkansas, but the specimens that we have seen so labeled are large-leaved forms of N. aquatica; and the fruit is not at all that of N. Ogeche. The very acid fruits of this species are called "wild limes."

3. GARRYA Dougl. in Lindl. Bot. Reg. t. 1686.—This peculiar southwestern and Mexican genus seems to bear no resemblance to our two other genera of *Cornaceæ*. The staminate and fertile flower-clusters are more or less amentaceous, though sometimes they do not seem to be true aments. For convenience, however, we will use the term "ament" for the flower cluster, meaning simply a narrow more or less elongated bracteate cluster. The fruit is usually called a "berry," presumably because it generally contains two stones, but otherwise it corresponds very well with the drupes of other *Cornaceæ*.

* Fertile aments with distant flowers and more or less foliaceous bracts.

1. **G. ovata** Benth. Pl. Hartw. 14. A shrub ½ to 2 meters

high, with branchlets and inflorescence more or less silky-pubescent: petioles 6 to 16 mm. long: leaves narrowly lanceolate to ovate, mostly acute and mucronate (sometimes obtuse), entire, clothed on both surfaces with a silky pubescence (or glabrate above), 2.5 to 6 cm. long, 1.2 to 3.5 cm. wide, with thickened muriculate margins: sterile aments with small connate bracts: fertile aments 2.5 to 7.5 cm. long, with somewhat distant flowers in the axis of bracts which are usually foliaceous and distinct: fruit globose to ovoid, becoming glabrous, sessile or short-pedicellate, 4 to 8 mm. in diameter.

Hab. W. Texas, and abundant southward in the mountains of Mexico.

Specimens examined: Guadalupe mountains, W. Texas (*Havard*).

We have examined an abundance of material of this common and variable Mexican species, and are satisfied that it is represented in our flora by the Texas specimens of Dr. Havard, which have narrow leaves and small ovoid fruits. To this must also be referred *Pringle* 131 (coll. of 1885), from Santa Eulalia Mountains, Mexico, distributed as *G. Lindheimeri* ?, in which the leaves are inclined to have undulate margins. This last form passes by intermediate gradations to

Var. **Lindheimeri.** Branchlets and both leaf-surfaces more or less clothed with kinky wool (or the upper leaf-surface glabrate with age): leaves oblong or obovate, mostly obtuse and mucronate, often a little larger and broader, and the margins not thickened and muriculate.—*G. Lindheimeri* Torr.

Hab. From Texas to Arizona, and extending into Mexico.

Specimens examined: Texas (*Lindheimer* 27, 512, 536), Austin (*Buckley*), Mountains of Kimble county (*Reverchon* 90), Rio Blanco (*Sargent*), Gillespie county (*Jermy*); W. Texas and N. Mexico (*Wright* 633).

Dr. Torrey's description was based upon Wright's sterile specimens. All the other collections examined have mature fruit. This variety is easily recognized by its remarkable kinky wool, occuring especially upon the lower leaf-surfaces and branchlets, but often also upon the upper leaf-surfaces. The bracts show great variation, the foliaceous forms being confined chiefly to the fertile aments.

2. **G. Wrightii** Torr. Pacif. R. Rep. 4. 136. Shrub ½ to 1 meter high, becoming glabrate: petioles 4 to 10 mm. long: leaves light green (drying bluish), oblong-lanceolate to elliptical or obovate, acute at each end, mostly mucronate, with thickish slightly muriculate margins, glabrous or nearly so on both sides, 1.8 to 5 cm. long, 1.2 to 3 cm. wide: aments more or less branching and distant-flowered; sterile aments

with smaller but distinct bracts; fertile aments 3.5 to 8.5 cm. long; upper bracts rather small (apt to be connate at base), becoming more foliaceous and distinct downward, until the lowest resemble the ordinary leaves (giving the appearance of sessile axillary flowers): fruit globose, becoming glabrous, sessile, 4 to 7 mm. in diameter.

Hab. From the counties of W. Texas, New Mexico and Arizona, adjoining Mexico, and southward into the mountains of Chihuahua.

Specimens examined: W. Texas, Presidio and El Paso counties (*Havard*); New Mexico (*Wright* 634, 1789), on the Rio Grande, Dona Ana county (*Mex. Bound. Surv.* 1637), Grant county (*Rusby* 253½); Arizona, Graham county (*Lemmon*), Pinal county (*Greene*), Pima and Cochise counties (*G. R. Vasey*), Santa Catalina mountains (*Pringle* of 1881).

* * Fertile aments densely flowered and with small scarious bracts.

3. **G. Fremontii** Torr. Pacif. R. Rep. 4. 136. Shrub 1.5 to 3 meters high, becoming glabrous: petioles 6 to 18 mm. long; leaves light green, ovate to oblong or elliptical (sometimes obovate), mostly acute at each end (sometimes obtuse at apex), usually somewhat mucronate, entire, smooth or nearly so on both sides, 2.5 to 7.5 cm. long, 1.2 to 3.5 cm. wide: fertile aments 5 to 11 cm. long; bracts prominent, connate above the middle, acute, somewhat silky: fruit globose, becoming glabrous, short-pedicellate, 4 to 6 mm. in diameter.

Hab. From S. Oregon (Umpqua mountains) southward into California to the Yosemite valley and Mt. Hamilton.

Specimens examined: Oregon, Umpqua mountains (*Wilkes' Exped.* 1183), Canyonville (*Howell*), "Cascade Mountains" (*Cusick*); California (*Bolander, Kellogg and Harford* 926, 927), Siskiyou county (*Greene* 953), Upper Sacramento (*Fremont's Exped.* 369), Plumas county (*Mrs. Austin*), "Sierra Nevada" (*Lemmon*), Mendocino county (*G. R. Vasey*), Lake county (*Bigerstaff*), Placer county (*Jones* 92), Yosemite valley (*Hooker & Gray, Canby*), Mt. Hamilton (*Brewer* 1305).

This species is apt to be confused with *G. flavescens*, but its glabrous branches and leaves, and glabrous pedicellate fruit should distinguish it. The bracts of both species are connate, but those of *G. Fremontii* are more apt to be connate almost to the tips.

4. **G. Veatchii** Kellogg, Proc. Calif. Acad. 5. 40. Spreading shrub, 1.8 to 2.5 meters high: branchlets pubescent with close appressed silky hairs: petioles short, 2 to 6 mm. long; leaves coriaceous, elliptic-ovate to -oblong (or sometimes almost obovate), acute at each end, mucronate, entire, glabrous or nearly so above, densely tomentose beneath, 2.5 to 7.5 cm.

long, 1.8 to 3.5 cm. wide: fertile aments 2.5 to 5 cm. long; bracts prominent, connate, acute or acuminate, silky: fruit somewhat ovate, densely silky or becoming glabrate, sessile, 6 to 8 mm. long.—*G. flavescens*, var. *Palmeri* Watson.

Hab. In the coast counties from Santa Barbara southward into Lower California and Cedros Island.

Specimens examined: Cedros Island (*Dr. Veatch*); Lower California (*Orcutt* 900); California, San Diego county (*Palmer* 117, 118), Los Angeles county (*O. D. Allen* 22), Santa Barbara county (*H. C. Ford*).

Var. **flavescens.** Leaves not so tomentose beneath, but alike silky on both sides (or becoming smoother above), 2.5 to 5 cm. long, 1.8 to 2.5 cm. wide, scarcely mucronate, on longer petioles (6 to 12 mm. long): fruit 6 to 8 mm. long.—*G. flavescens* Watson.

Hab. From S. Nevada and Utah to Arizona and New Mexico.

Specimens examined: S. Utah, Washington county (*Palmer* 183½), Kane county, Kanab (*Mrs. A. P. Thompson*); Arizona (*Capt. C. A. Curtis*).

5. **G. buxifolia** Gray, Proc. Am. Acad. 7. 349. A small shrub ½ to 1½ meters high: petioles, 2 to 7 mm. long; leaves oblong-elliptical (sometimes almost round), acute at each end (sometimes obtuse at base), entire, becoming smooth and shining above, densely white silky beneath, 1.8 to 4 cm. long, 8 to 24 mm. wide: fertile aments 2.5 to 3.5 cm. long; the bracts short, acute, more or less silky: fruit globose, becoming glabrous, nearly sessile, 5 to 6 mm. in diameter.

Hab. Red Mountains, Mendocino county, California.

Specimens examined: From the original station (*Bolander* 6579, *Kellogg & Harford* 928).

6. **G. elliptica** Dougl. in Lindl. Bot. Reg. t. 1686. A stout shrub or small tree 1.5 to 2.5 meters high: petioles 6 to 12 mm. long; leaves elliptical, rounded at base, round or acute and mucronate at apex, undulate on the margin (whose infolding often gives a toothed appearance), smooth above, densely tomentose beneath, 3.5 to 10 cm. long, 1.8 to 5.5 cm. wide: aments solitary or clustered; sterile aments 5 to 30 cm. long, the bracts truncate or acute, silky; fertile aments stouter, 2.5 to 8.5 cm. long, with acute or acuminate bracts: fruit globose, densely silky-tomentose, sessile, 6 to 9 mm. in diameter.

Hab. Near the coast, from Monterey, California, to the Columbia river.

Specimens examined: California (*Thos. Coulter* 647, *Hartweg* 1935, *Kellogg & Harford* 928, *Brewer* 1564), San Francisco Bay (*Wilkes' Exped.* 1490), Berkely (*Greene*); Oregon, Curry county, Chetco (*Howell*), "Columbia and southward" (*Douglas*).

Crawfordsville, Ind,

BRIEFER ARTICLES.

Glandular pubescence in Aster patens.—While studying the involucral bracts of some of our Asters I found a specimen of A. patens which differed from the description in that the bracts of the involucre were apparently glandular pubescent. This led to a further examination of this species and incidentally others that were described as being glandular pubescent.

The earlier authors, in their descriptions of Asters, do not mention glandular hairs, even when they are so evident as in the very common, A. Novæ-Angliæ. I have not been able to find any description of A. patens in which it is credited with glandular pubescence. Aiton, who first described it (Hort. Kew.), followed by Pursh and Michaux (A. amplexicaulis), does not speak of any kind of pubescence on the bracts. Elliott (A. undulatus) says, "involucre pubescent;" Darlington (Fl. Cest.), "involucre minutely scabrous;" Nees (Ast.), "periclinii * * foliolis * * scabris;" Torrey (Nat. His. N. Y.), "scales minutely pubescent or hairy and somewhat granulate." It is described by other authors in about the same way.

In the case of *A. patens* Ait. var. *phlogifolius* Nees, I find no mention of glandular pubescence except under *A. auritus* (Lindl. in DC. Prod.) which Dr. Gray refers to this variety. It is described, " * * * involucri parum imbricati, squamis linearibus acuminatis ramulusque glandulosis."

In the latest revision of our Asters (Gray, Syn. Fl.) several species are described as being glandular. Subsection 2, of Aster proper—Glandulosi—consisting of eight species, is set off by, "Involucre and usually branchlets viscidly or pruinose-glandular * * * ." Among the characters of subsection 6—Patentes—consisting of *A. patens* Ait. with two varieties, *gracilis* Hook. and *phlogifolius* Nees, is "bracts * * * minutely granulose or scabrous, but not glandular." In order to guard against mistakes, it is remarked in parenthesis, under Glandulosi, "Glandular involucre also in species of ? Machæranthera," and in connection with A paucifloras, "involucre * * * viscid-glandular * * * might be sought among the Glandulosi of true Aster." Glandular pubescence occurs in several other species, but in none is it a prominent character. But the finding of glandular hairs in A. patens might be misleading to a student.